CONFIRMED MINUTES
IHRA SIDE IMPACT WORKING GROUP
13th MEETING
GENEVA
7-8 DECEMBER 2001

1 THOSE PRESENT

Keith Seyer (Chair)	Dept Transport & Regional Services, Australia
Dainius Dalmotas	Transport Canada
Joseph Kanianthra	NHTSA
Richard Lowne (Temp Sec)	EEVC
Christoph Müller	OICA, Europe
Toshiyuki Nishimoto	Ministry of Land, Infrastructure and Transport, Japan (7th. am only)
Michiel van Ratingen	EEVC
Hideki Yonezawa	Ministry of Land, Infrastructure and Transport, Japan
Takahiko IKARI	JASIC Geneva Office

2 CONFIRMATION OF AGENDA

The draft Agenda was approved with the addition of a report on JMoT testing under new agenda item 10 and a discussion on the initial drafting of the draft IHRA Side Impact test procedures, under Any Other Business. The revised agenda has document number SIWG 139 Rev 3.

3 MINUTES OF THE 12th. MEETING.

Dr Kanianthra (JK) noted that NHTSA was currently reviewing the data on the relative frequency of males to females in serious and fatal side impacts, including two more years' data. These would be reported at the next meeting of the Working Group. In the meantime, the figures shown in Section 8 of the minutes of the 12th meeting should be treated with caution. With this and a small typing correction, the minutes were approved (document number SIWG 137 Rev 2).

4. IHRA STEERING COMMITTEE.

The Steering Committee had not met since the last SIWG meeting. The next meeting of the SC was tentatively scheduled for 9-10 May in Washington.

5. WORLDSID.

The WorldSID Task Group had not met since the last SIWG meeting. The Tri-chair committee were still predicting that the first production dummy would be available commercially in 2004. Mr Lowne asked about plans for a 5th percentile version. It was reported that the WorldSID group were interested in developing a 5th percentile version but it would require funding. Dr van Ratingen (MvR) noted that it was only a matter of scaling the dimensions, responses and injury criteria but this is likely to impose space problems for the instrumentation. JK reminded the group of the comments made during the GRSP meeting about the need for side impact dummies to have good biofidelity and performance in high angled impacts (up to 45°). MvR said that this was mainly an instrumentation issue for WorldSID – the IRTRAC not being suitable for angled deflections of shoulder or chest. JK mentioned that NHTSA were developing a new multi directional deformation measurement system via Conrad Technology based on a multiple LED array.

The chairman asked how we could encourage the provision of funding for the 5th percentile. Dr Dalmotas (DD) observed that the main interest in a harmonised test procedure and test dummy was with the automobile industry. For 'regulators', there seemed to be no distinct advantage and possibly a disadvantage if compromises had to be made to achieve harmonisation. Therefore this should be put to OICA, it being in their interest to ensure that a single harmonised 5th percentile dummy was developed.

ACTION OICA.

Experience with the first prototype WorldSID dummy had indicated a problem with the dynamics of the shoulder due to the presence of the current shoulder load cell. The question of whether a shoulder load cell is necessary was raised. It was agreed that the specific measurement of load at the shoulder was not felt to be necessary by the proposed IHRA Side Impact Test Procedures. However, it *was* necessary to be able to detect the transmission of non-biofidelic loads through the shoulder. The chairman agreed to write to the WorldSID Task Group to say that we (SIWG) did not foresee the need to measure injury risk to the shoulder but did wish to ensure that this could not form an uninstrumented load path.

ACTION KS

6 IHRA BIOMECHANICS WORKING GROUP.

The IHRA Biomechanics WG met at the time of the Stapp Conference (Nov 17th) but, due to travel restrictions following the terrorist attack on Sept 11th, was attended only by USA (NHTSA), Canada (TC) and Europe (EEVC, (DC only)). The main topic of discussion was the methodology of ranking the biofidelity of dummies. It is expected that the NHTSA cumulative variance method will be used but the exact calculation procedures are still to be decided. The Biomechanics report to the Steering Committee, due by December 2001, is now likely to be late.

7 EEVC ACTIVITIES

Mr Lowne (RL) described the current activities of EEVC WG13 (Side Impact Test Procedures). Much of the effort in the last year had been devoted to the development of a new specification for the MDB face used in ECE Regulation 95. This had now been completed and had been presented to ECE-GRSP during the previous day (document number SIWG 141). The other two activities had been the development of an interior headform test procedure as a supplement to ECE R95 and the supporting activity for the IHRA side impact work.

The basics of an interior headform test procedure (document number 142) have been agreed as using the FMH, specified in FMVSS201, in free-flight mode. The impact points were expected to be defined initially according to FMVSS201. However, as this was a Side Impact Test, the points would be limited to those liable to be contacted by a restrained struck side occupant. These would probably be limited by a set of four planes orientated with respect to the locations of the heads of the 50th and 5th percentiles in their respective seating positions. Then impact points and impact angles in the vicinity of the identified points would be selected on the basis of "worst case", provided this can be determined from knowledge of the vehicle structure. This aspect was currently being studied.

The impact tests undertaken in support of IHRA activities were reported under Agenda item 10.

8 GEOMETRIC MEASUREMENTS.

Mr Yonezawa (HY) presented the measurements requested by IHRA SIWG on a range of SuperMini, Mini, Small and Medium cars (document SIWG 143). RL presented some data on European cars of Small, Medium and Large categories (document SIWG 144). These data included the distance between the R-points for the front and rear seat occupants. It was agreed that others would try to collect these data (R-point separation) also. KS provided data for two large Australian cars (document SIWG 145) and JK provided some data on US cars (document SIWG 146). Most of the measurements listed in the previous IHRA minutes were not readily available but he agreed to try to collect information on aperture width and R-point separation from OICA NA for the next meeting. DD also agreed to look for appropriate data, including front and rear R-points, from the TC impact test database.

A first review of the data presented suggested good consistency between the different databases and also relatively small changes between vehicle sizes for the occupant compartment measurements. Wheel base and measurements between the passenger compartment and the rear axle position did differ, but these were not considered to be as significant regarding side impact performance. It was felt that this information might help to decide how to target the MDB.

To simplify comparisons, MvR agreed to collate all data onto a single database.

ACTIONS: ALL

9 ACCIDENT STUDIES.

Mr Yonezawa presented an analysis of passenger car and minivan occupants fatally or seriously injured in side impacts, analysed by gender and age, collected from the National Traffic Accident Database of the Police Agencies over the years 1994 – 98 (document SIWG 147). Both the fatal results and the serious injury results showed that 50 percent or greater were males for the front seats. This was more prominent for the fatal sample. In the age group 16 to 25, there were more females than males but the reverse was the case for the other age groups so that, overall, males predominated, albeit only slightly for some situations.

For rear seats, females predominated. The overall numbers indicated that this was a sample of the whole database and not the total casualty figures.

10 TEST RESULTS

Transport Canada

DD presented test results for impacts with the Ford Explorer (99 and 2001 year models), Toyota Tacoma and Acura MDX as bullet vehicles, all to the Toyota Camry as target vehicle (document SIWG 148). He noted that TC had found a need to 'wedge' the rear SID-2s dummy to a more upright posture to provide a more realistic seating position due to lack of suitable neck angle adjustment. The observed final deformation profile with the IIHS MDB, massed to 1500kg, was similar to car-to-car final profiles.

A test with the new Explorer reduced the driver chest acceleration but did not affect the head acceleration. All chest and abdomen responses were very high. The 2002 Explorer's front frame

horns and bumper beam were lowered (approximately 50mm compared to the previous model) to align with the frame horns and bumper beam of a passenger car such as the Ford Taurus.

For the rear dummy, the head responses were rather variable, with the highest value observed in the crabbed test. The abdomen responses for the rear dummy were probably all acceptable, although DD was not sure that the chest and abdomen responses of the SID-2s were reliable under the highly angled loadings created under the impact conditions for the rear seat occupant.

Tests had been undertaken with the IIHS MDB in perpendicular impact mode against the Camry, shifting the point of contact rearwards. Shifting the impact point rearwards up to 175mm behind the ECE Reg 95 location did not change the driver head or chest accelerations much nor the B-pillar profile and good head contact was obtained. The rear passenger head response increased as the MDB contact point was moved rearwards.

The IIHS MDB gave earlier and higher thoracic responses than the car-to-car tests using the Passat and the Camry as bullet vehicles. The Explorer, as bullet vehicle, gave similar timings but higher responses.

TC is planning to perform a perpendicular IIHS MDB impact to a Megane and with the Freelander to a Camry.

JMOT.
JMOT has undertaken two full scale tests: unibody SUV (1500 kg)-to-car (1432 kg) and IIHS MDB-to-car (document SIWG 149). Both tests used a EuroSID-1 dummy in the front seat (struck side) and a SID-IIs dummy in the rear seat (struck side). The impact location was as defined for the ECE Reg 95 and both the striking vehicle and the MDB were 1500kg. The MDB lower edge was 220mm above the bullet car longitudinals. The IIHS MDB hardly deformed at all while the SUV bumper bar did deform.

Comparing the two tests, the following conclusions were noted:

Struck Vehicle deformation	Belt line	IIHS MDB > SUV
	H-point and side sill	IIHS MDB < SUV
Front dummy	HPC, Rib Defn & V*C	IIHS MDB > SUV
	Abd F	IIHS MDB ˜ SUV
	Pub Sym F	IIHS MDB > SUV
Rear Dummy	HPC and Pub Sym F	IIHS MDB ˜ SUV
	Rib Defn & V*C	IIHS MDB < SUV
	Abd F, Iliac F & Pel Acc	IIHS MDB > SUV

JMOT intended to undertake further analysis of these tests, including a more detailed review of the rear dummy responses and a comparison of the dummy responses with vehicle stiffness.

JK felt that, if the IIHS proceeds with testing to this new MDB, it was likely to become the de facto US MDB.

EEVC

RL presented the first results using new MDB face designs developed between TRL and Cellbond as part of the EEVC programme in support of IHRA activities (document SIWG 150). He emphasised that these were very recent results, some only obtained earlier that week, and it had not been possible to undertake a full review or draw conclusions.

Two profiled and chamfered MDB faces had been designed, wider than current faces, with the intention of loading both the front and rear dummies. The stiffnesses of the blocks for these MDB faces were based on rigid load cell wall impacts, mainly undertaken in Japan by JARI. Most of the EEVC load cell wall impact tests were now performed using 150mm aluminium honeycomb in front of the wall. After careful consideration, it had been decided that rigid impacts would give a more representative value for the front stiffnesses of cars as seen by the struck car in side impacts.

Both MDB face designs used aluminium honeycomb of increasing stiffness with crush. The faces were in two layers, the upper layer was all of the same stiffness while the lower layer was also of this stiffness for the "homogeneous" MDB face but was in three blocks of stiffness determined by the load cell wall results for the "non-homogeneous" MDB face. The dimensions and locations of these elements were determined from the geometric studies of current cars (longitudinal location, R-point positions and A to C– post dimensions. All MDBs were 1500kg mass.

Perpendicular impacts to Meganes with these MDB faces and with the IIHS MDB face were compared with moving car-to moving car impact to Meganes with a Ford Mondeo (Mk2) and a Landrover Freelander. Both front and rear dummies were EuroSID-1 dummies. In addition, rigid load cell wall tests had been performed with the two new prototype EEVC MDB faces.

Initial reviews of the results suggested that the non-homogeneous responses were closer to the car-to-car range of values but considerably more analysis was needed before firm conclusions could be drawn

KS suggested adding a plate above the MDB face block to encourage head protection. RL responded that EEVC was currently analysing accident data to determine the need to provide head impact protection other than in pole impacts.

NHTSA

Some load cell wall impact tests had been undertaken using the IIHS MDB, the FMVSS 214 MDB and the Ford F150 (document SIWG 151). The impact speed had been selected to give the same energy input (214; 59.7km/h, IIHS; 56.4km/h, F150; 56km/h). The total force observed was c. 1650kN for the IIHS and c. 750kN with the F150.

The force-deformation curves were similar up to about 300mm after which the IIHS was far stiffer for deformations up to c. 400mm. Average stiffnesses for a range of vehicle types had been obtained. SUVs and Trucks were highest followed by Vans and then cars. The IIHS MDB was similar to SUVs while the 214 MDB face was higher than all of the cars but less than most vans.

The average effective height of the frontal force was 400 – 500mm for cars, 500-600mm for SUVs, Trucks and Vans, c. 500mm for the 214 and 720mm for the IIHS MDB.

OICA-Europe.

Christoph Müller (CM) stated that OICA would like to harmonise on the test procedure but was not comfortable with the IIHS MDB. He felt that it was far too stiff for a world market test. It was too stringent a test for Europe- it was needed only for the US special problem.

OICA now needs to consider what research was needed to understand the implications for European car manufacturers of the IIHS and other proposed MDB faces.

11 OTHER BUSINESS.

Non-struck Side Occupants.

It was reported that the Medical College of Wisconsin has undertaken a test with a non-struck side PMHS and a comparison test with WorldSID. These results would be presented at the next meeting.

RL asked whether the need was to test the non-struck side occupant as a sole occupant or whether occupant-to-occupant interaction was important. DD agreed to review the side impact accident data to determine whether the main problem is single occupancy (e.g .driver only, struck on the passenger side) or with two front seat passengers present.

ACTION DD

Drafting the IHRA Side Impact Test Procedures.

The chairman reminded the Group that he had committed to the presentation of a draft procedure at the next ESV Conference, to be Validated by the following ESV Conference in 2005. To achieve this, he felt that we should initiate the drafting of the test procedure and proposed that different members should take responsibility for the different individual sections.

It was agreed that the responsibilities would be:

MDB Test procedure:	DTRS, Australia
Pole impact test:	NHTSA
Interior headform test:	EEVC
OOP & airbag interaction	TC.

Future research and testing.

It was thought that it would now be highly beneficial to develop a collaborative test matrix to deliver the results needed for the required IHRA side impact test procedure.

RL said that EEVC had to review the current test results and then consider what tests would be helpful for the future work of IHRA.

DD noted that he had been surprised by the differences between deformation profiles seen in EEVC and TC tests (presence or absence of the "dimple" effect caused by the B-pillar). He wondered whether there was a real difference between the designs of the front bumpers between Europe and North America, perhaps due to the low speed bumper test in the US. He would like to explore whether this difference was significant.

It was agreed that it would be necessary to communicate more by email to speed up the process.

12 NEXT MEETING.

Barcelona and Melbourne were suggested for the next meeting. After discussion, it was agreed that the next meeting would be held in Melbourne in the same week as ICRASH or just before it. The provisional dates agreed were Feb 28th-March 1st or Feb 21-22 2002.